Introduction to Game Theory

B. Nebel, R. Mattmüller   University of Freiburg
T. Schulte, D. Speck   Department of Computer Science
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Exercise Sheet 10
Due: Thursday, July 11, 2019

Send your solution to schultet@informatik.uni-freiburg.de (PDF only) or submit a hardcopy before the lecture. The exercise sheets may and should be worked on and handed in in groups of three students. Please indicate all names on your solution.

Exercise 10.1 (Deferred Acceptance Algorithm, $1 + 4 + 3$ points)

In this exercise you will implement the deferred acceptance algorithm for computing stable matchings in **Python 3**. Please submit your solution as a single file called defacc.py via email to schultet@informatik.uni-freiburg.de. Don't forget to mention all group members in the email and source code.

(a) Implement a program that reads in two sets of preference relations from an external json-file in the following format:

```
{
    males: {
        m1: [w1, w2],
        m2: [w2, w1]
    },
    females: {
        w1: [m1, m2],
        w2: [m2, m1]
    }
}
```

Here m1: [w1, w2] represents the preferences of male 1: $w1 \prec_{m1} w2$. Your program should support an arbitrary number of males and females. Python 3 provides the json-module for parsing json files.

(b) Implement the deferred acceptance algorithm with male proposals as a function that, for two given sets of preference relations (male and female) returns the respective stable matching. Your program should be callable from the command line with a json file as specified above and print the solution to the console. Consider the following example, where prefs.json contains the json code from part (a):

```
> python defacc.py prefs.json
m1: w2
m2: w1
```

(c) Show that the male-proposal deferred acceptance algorithm is not incentive compatible for the females. Hint: you can use your program to generate a valid example.